

**Notice of Allowability**

Application No.

09/705,316

Examiner

Thuan D. Dang

Applicant(s)

BATTISTE, DAVID R.

Art Unit

1797

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--**

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to the rce filed 11/5/07.
2. ☒ The allowed claim(s) is/are 1,2,4,5,8,9,12,30,32,33,35-37,40,41 and 43-50.
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some\* c) ☐ None of the:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

\* Certified copies not received: \_\_\_\_\_.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

**THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS ( as "replacement sheets") must be submitted.
- (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review ( PTO-948) attached
- 1) ☐ hereto or 2) ☐ to Paper No./Mail Date \_\_\_\_\_.
- (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date \_\_\_\_\_.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

**Attachment(s)**

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| 1. <input type="checkbox"/> Notice of References Cited (PTO-892)   | 5. <input type="checkbox"/> Notice of Informal Patent Application  |
| 2. <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 6. <input checked="" type="checkbox"/> Interview Summary (PTO-413),<br>Paper No./Mail Date <u>20080118</u> . |
| 3. <input type="checkbox"/> Information Disclosure Statements (PTO/SB/08),<br>Paper No./Mail Date _____    | 7. <input checked="" type="checkbox"/> Examiner's Amendment/Comment  |
| 4. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit<br>of Biological Material | 8. <input checked="" type="checkbox"/> Examiner's Statement of Reasons for Allowance                         |
|  | 9. <input type="checkbox"/> Other _____.   |

### EXAMINER'S AMENDMENT

An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Mr. Faries on 1/18/08.

The application has been amended as follows:

Claim 1 has been rewritten as:

---A process for olefin oligomerization in a reactor, the process comprising:

providing a reaction mixture in the reactor, the reaction mixture comprising:

at least one reactant comprising at least one olefin monomer and optionally

hydrogen, wherein the olefin monomer comprises ethylene; and

a catalyst system suitable for the oligomerization of olefin monomers;

contacting the olefin monomer and the catalyst system in a reaction zone;

monitoring an olefin oligomerization reaction by using low-resolution

Raman spectrometry equipment to provide an output signal representative of

ethylene or 1-hexene, or a combination thereof, wherein the oligomerization

reaction comprises a trimerization reaction;

recovering an oligomer, wherein the oligomer comprises 1-hexene; and

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adjusting the olefin oligomerization reaction in response to the output signal provided by the Raman spectrometry equipment.---

Claim 3 has been canceled.

Claim 30 has been rewritten as:

---A trimerization process for producing 1-hexene, the process comprising:  
monitoring a trimerization reaction of ethylene monomer by using Raman spectrometry equipment to generate an output signal representative of at least one chemical component in the trimerization reaction, wherein the at least one chemical component comprises ethylene monomer or 1-hexene, or a combination thereof, and wherein the Raman spectrometry equipment comprises low resolution Raman spectrometry equipment;  
recovering 1-hexene from the trimerization reaction; and  
adjusting a condition of the trimerization reaction in response to the output signal generated by the Raman spectrometry equipment.---

Claim 31 has been canceled.

Dependency of claim 32 has been changed to ---claim 30---

Claim 41 has been rewritten as:

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---A process for trimerization of ethylene monomer to produce 1-hexene, the process comprising:  
contacting the ethylene monomer, a catalyst system, and optionally hydrogen in a reaction mixture;  
monitoring the trimerization of the ethylene monomer by using low-resolution Raman spectrometry equipment to provide an output signal representative of at least one chemical component in the reaction mixture, wherein the at least one chemical component comprises the ethylene monomer or the 1-hexene, or a combination thereof;  
and  
adjusting the trimerization of the ethylene monomer in response to the output signal provided by the Raman spectrometry equipment.---

Claim 42 has been canceled.

New claims 43-50 have been added as:

43. The process of claim 41, wherein the output signal is representative of a concentration of the at least one chemical component.
44. The process of claim 41, wherein the trimerization of the ethylene monomer is adjusted by adjusting an amount within the reaction mixture of the ethylene monomer, hydrogen, the catalyst system, or a combination thereof.

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45. The process of claim 41, wherein the low-resolution Raman spectrometry equipment comprises a Raman fiber optic probe that is in contact with the reaction mixture.
46. The process of claim 41, wherein the low-resolution Raman spectrometry equipment comprises a Raman fiber optic probe that is in contact with a discharge of the reaction mixture.
47. The process of claim 41, wherein the low-resolution Raman spectrometry equipment has a resolution in the range of from about 15 wavenumbers to about 30 wavenumbers.
48. The process of claim 41, wherein the process is performed in two or more reactors connected in series, wherein effluent from an upstream reactor is provided as input to a downstream reactor, wherein the monitoring comprises determining a concentration of the monomer in the effluent by the Raman spectrometry equipment.
49. The process of claim 48, wherein adjusting comprises adjusting an amount of the ethylene monomer or hydrogen, or a combination thereof, fed to the downstream reactor.
50. The process of claim 41, wherein monitoring the trimerization of the ethylene monomer comprises determining an amount of conversion of the ethylene monomer to the 1-hexene by using the low resolution Raman spectrometry equipment.

The following is an examiner's statement of reasons for allowance: the prior art of record does not disclose or render obvious a process of trimerization of ethylene to produce hexene in which the ethylene and/or hexene is monitored by using a low-resolution Raman spectrometry

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equipment to provide an output and then the reaction is adjusted in response to the output signal provided by the equipment. The closest art of record - Lashier et al (5,689,028) - discloses a process trimerization of ethylene to produce hexene. However, Lashier does not disclose using a low resolution Raman spectrometry equipment to monitor the reaction and adjust the reaction accordingly. In the previous Office action, the examiner combined the teaching of Alsmeyer (5,638,172) for lacking of the use of Raman spectrometry equipment. However, Alsmeyer does not disclose what kind of Raman equipment is used and especially used for the trimerization of ethylene to hexene. As disclosed in the specification and argued by applicants in the remark filed with the RCE, especially in the article "Low-Resolution Raman Spectroscopy" by Clarke et al, one having ordinary skill in the art would obviously not be motivated to use low-resolution Raman equipments for trimerization of ethylene to produce hexene since the peaks of ethylene and hexene are so close for being detected by a low-resolution Raman spectrometry equipment.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thuan D. Dang whose telephone number is 571-272-1445. The examiner can normally be reached on Mon-Thu.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn Caldarola can be reached on 571-272-1444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Thuan D. Dang /  
Primary Examiner  
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